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Title:

SINGLE-USE, DISPOSABLE COSMETIC CLEANSER, USED FOR CLEANSING SKIN OR HAIR, COMPRISES WATER-INSOLUBLE SUBSTRATE WITH SPECIFIED WET FLEXIBILITY AND LATHERING SURFACTANT ;

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AU6216801, BR0110124, CZ20023453, EP1274394, FR2813020, GB2362813 ;

ABSTRACT:

Single-use, disposable cosmetic cleanser (IA) comprises a water-insoluble substrate and a lathering surfactant, which has a wet flexibility of

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(54) Title: SUBSTANTIALLY DRY CLEANSING PRODUCT OF IMPROVED LATHERABILITY AND WET FLEXIBILITY

(57) Abstract: This invention relates to a disposable, single-use, substantially dry cleansing product having wet flexibility. The product comprises a lathering surfactant. Optionally, the product comprises a substrate comprising an apertured fabric. Preferably the product has a specific lather volume coefficient.

# Substantially Dry Cleansing Product of Improved Latherability and Wet Flexibility

The invention relates to substantially dry, disposable, personal cleansing products.

Personal cleansing products have traditionally been marketed in a variety of forms such as bar soaps, creams, lotions, and gels. These formulations have attempted to satisfy a number of criteria to be acceptable to consumers. These criteria include cleansing effectiveness, skin feel, skin mildness and lather volume. Ideal personal cleansers should gently cleanse the skin or hair, cause little or no irritation, and not leave the skin or hair overly dry after frequent use. Personal cleansing products have also been combined with water insoluble fibrous substrates to improve convenience to the user.

A series of granted and pending patent applications have been published by Procter & Gamble describing substantially dry, disposable, personal cleansing products which address many of the aforementioned functionality concerns. These products are substantially dry articles having deposited onto a woven or non-woven cloth a cleansing composition of surfactant, structurant, skin conditioning agent and other performance ingredients.

U.S. Patent 5,951,991 (Wagner et al.) focuses on providing the substrate with a conditioning emulsion separately impregnated from the lathering surfactant onto the cloth substrate. U.S. Patent 5,980,931 (Fowler et al.) emphasizes

impregnation of oil soluble conditioning agents. Manufacturing processes for these products are reported in U.S. Patent 5,952,043 and U.S. Patent 5,863,663, both to Mackey et al.

Unfortunately, the substantially dry disposable cleansing products disclosed in the prior art are generally unsuitable for cleansing the entire body for various reasons. One weakness of the prior art disposable wipes is that the wipe doesn't retain its shape well during cleansing after becoming saturated with water. This lack of shape memory causes the wipe to either roll up like a pencil or crumple into a small ball when in use which is especially problematic for a body washing application. Another problem is the deficient latherability found for very mild cleansing agents such as C12 to C24 fatty acids when used in conjunction with the prior art wipes.

The present invention seeks to solve the problem of shape memory or "bounce-back". Thus, the present invention provides a wipe that comprises a water insoluble substrate, lathering surfactant and structurant system which together unexpectedly provide "wet flexibility".

Wet flexibility is herein defined as the ability of the surfactant impregnated wipe to return to its original shape after being deformed while saturated with water.

"Substantially dry" is herein defined as having a water content of less than about 0.15 weight ratio to the substrate.

The wipe of the present invention typically also solves the problem of deficient lathering ability of mild cleansing agents. It has been unexpectedly observed that the combination of such mild cleansing agents and an apertured fabric provides a substantial amount of lather during use.

In a preferred embodiment, the dry disposable cleansing wipe combines wet flexibility, a mild lathering surfactant, and a $C_5$-$C_{12}$ alkyl diol structurant system. More preferably, the wipe will be treated with a coating solution containing $C_5$-$C_{12}$ diol/lathering surfactant ratio between 1 to 8 and 1 to 1. Most preferably, the water insoluble substrate of the wipe has at least one apertured non-woven fabric layer.

This invention relates to a substantially dry, disposable, mild cleansing article for cleansing the body with a good lather comprising a water insoluble substrate having at least one apertured layer impregnated with a lathering surfactant, and having wet flexibility.

The invention will now be further described with reference to the accompanying drawings in which:

- Figure 1 is a perspective representation of one embodiment of the cleansing article of the invention having a single layer apertured water insoluble substrate;

- Figure 2 is a perspective representation of another embodiment of the cleansing article of the invention having two layers of an insoluble substrate bonded together;

- Figure 3 is a cross-sectional view taken along line 2-2 of Figure 1;

- Figure 4 is a cross-sectional view taken along line 4-4 of Figure 2;

- Figures 5(a) and (b) are photographs of the lather produced by two embodiments of the cleansing article of the invention having a single layer apertured water insoluble substrate;

- Figure 5(c) is a photograph of the lather produced by an embodiment of a comparative cleansing article having a single layer apertured water insoluble substrate; and

- Figures 6(a) and (b) are photographs of the lather produced by two embodiments of the cleansing article of the invention having two layers of an insoluble substrate bonded together.

Referring now to the drawings in which like numbers represent like elements, in Figure 1, cleansing article 10 is made up of a water insoluble substrate or fabric 12 containing apertures 14 distributed in a uniform or non-uniform arrangement throughout fabric 12.

Referring now to Figure 2, cleansing article 20 contains first layer 22 laminated onto second layer 26 along interface 28. First layer 22 contains apertures 24 distributed either uniformly or non-uniformly throughout

first layer 22. Second layer 26 is a non-apertured fabric having preferably a less dense arrangement of fibers than first layer 22.

In Figure 3, cleansing article 10 is shown along cross-section 2-2 depicted in figure 1.

In Figure 4, cleansing article 20 is shown along the cross section 4-4 depicted in Figure 2. First layer 22 is laminated to second layer 26 along interface 28. First layer 22 also has apertures 24 distributed either uniformly or non-uniformly therethrough.

In Figure 5(a), a rich, bubbly lather is depicted which is produced according to the lathering method described below by the inventive wipe comprising a single layer of 6 by 8 inch (152.4 by 203.2 mm) apertured PGI fabric coated with 0.75 gms of the composition described in Table 1.

In Figure 5(b), a rich, bubbly lather is depicted which is produced according to the lathering method described below using a wipe of the present invention comprising a single layer of 6 by 8 inch (152.4 by 203.2 mm) apertured PGI fabric coated with 0.75 gms of the composition described in Table 3.

In Figure 5(c), a loose, bubbly lather is depicted which is produced according to the lathering method described below using a comparative wipe comprising a single layer of 6 by 8 inch (152.4 by 203.2 mm) non-apertured CLC 062 fabric coated with 0.75 gms of the composition described in Table 1.

In Figure 6(a), a creamy, bubbly lather is depicted which is produced according to the lathering method described below using a wipe of the present invention comprising a single layer of 6 by 8 inch (152.4 by 203.2 mm) apertured PGI fabric coated with 4.8 gms of the composition described in Table 4, which is bonded to a single layer of Carlee high loft fabric.

In Figure 6(b), a creamy, bubbly lather is depicted which is produced according to the lathering method described below using a wipe of the present invention comprising a single layer of 6 by 8 inch (152.4 by 203.2 mm) apertured DuPont 8688 fabric coated with 4.8 gms of the composition described in Table 4, which is bonded to a single layer of Carlee high loft fabric.

The lather of the wipes of the present invention is characterized by a rich or creamy appearance compared to the loose, bubbly or airy appearance of the lather of comparative wipes. The bubble diameter distribution of a rich or creamy lather is narrow, and substantially uniform, with the mean bubble diameter preferably below about 200 microns. In contrast, the bubble diameter distribution of a loose, bubbly or airy lather is wider, and substantially non-uniform, with the mean bubble diameter above about 200 microns, typically above about 500 microns. The stability or persistence of the lather of the wipes of the present invention is also substantially greater than that of the lather of comparative wipes.

The dry wipes of the present invention contain a water insoluble substrate as a component. By "water insoluble" is meant the substrate does not dissolve or readily break apart upon immersion in water. A wide variety of materials can be used as the substrate. The following non-limiting characteristics are desirable:

(i) sufficient wet strength for use,

(ii) sufficient abrasivity,

(iii) sufficient loft and porosity,

(iv) sufficient thickness, and

(v) appropriate size.

Non-limiting examples of suitable insoluble substrates which meet the above criteria include non-woven substrates, woven substrates, hydro-entangled substrates, air entangled substrates and the like. Preferred embodiments of the present invention employ non-woven substrates since they are economical and readily available in a variety of materials. By non-woven is meant that the layer is comprised of fibers which are not woven into a fabric but rather are formed into a sheet, particularly a tissue. The fibers can either be random (i.e., randomly aligned) or they can be carded (i.e. combed to be oriented in primarily one direction). Furthermore, the non-woven substrate can be composed of a combination of layers of random and carded fibers.

Non-woven substrates may be comprised of a variety of materials both natural and synthetic. By natural is meant that the materials are derived from plants, animals, insects or byproducts. By synthetic is meant that the materials are obtained primarily from various man-made materials or from

material that is usually a fibrous web comprising any of the common synthetic or natural textile-length fibers, or mixtures thereof.

Non-limiting examples of natural materials useful as components in the present invention are silk fibers, keratin fibers and cellulosic fibers. Non-limiting examples of keratin fibers include those selected from the group consisting of wool fibers, camel hair fibers, and the like. Non-limiting examples of cellulosic fibers include those selected from the group consisting of wood pulp fibers, cotton fibers, hemp fibers, jute fibers, flax fibers, and mixtures thereof. Wood pulp fibers are preferred while all cotton fibers (e.g. cotton pads) are normally avoided.

Non-limiting examples of synthetic materials useful as components in the present invention include those selected from the group consisting of acetate fibers, acrylic fibers, cellulose ester fibers, modacrylic fibers, polyamide fibers, polyester fibers, polyolefin fibers, polyvinyl alcohol fibers, rayon fibers and mixtures thereof. Examples of some of these synthetic materials include acrylics such as Acrilan®, Creslan®, and the acrylonitrile-based fiber, Orlon®; cellulose ester fibers such as cellulose acetate, Arnel®, and Acele®; polyamides such as Nylons (e.g., Nylon 6, Nylon 66, Nylon 610 and the like; polyesters such as Fortrel®, Kodel®, and the polyethylene terephthalate fibers, Dacron®; polyolefins such as polypropylene, polyethylene; polyvinyl acetate fibers and mixtures thereof.

Non-woven substrates made from natural materials typically consist of webs or sheets most commonly formed on a fine wire screen from a liquid suspension of the fibers. Substrates made from natural materials useful in the present invention can be obtained from a wide variety of commercial sources.

Non-woven substrates made from synthetic material useful in the present invention can also be obtained from a wide variety of commercial sources, such as e.g. Sontaro® 8868, a hydro-entangled material, containing about 50% cellulose and about 50% polyester, and having a basis weight of about 60 gsy or 2.2 oz per sq. yard (0.072 $kg/m^2$), having rectangular apertures of about 1.5 mm by 2 mm in dimension with about 150 to 160 apertures per sq. inch (23.3 to 24.8 apertures per $cm^2$), available from Dupont Chemical Corp; PGI Lavett fabric, a 2.35 oz/sq. yd. (0.080 $kg/m^2$), 63% rayon/29% PET/8% binder fabric with rectangular apertures of about 2 mm x 3 mm in dimension having about 40 to 45 apertures per square inch (6.2 to 7.0 apertures per $cm^2$) from PGI Corporation; Carlee high loft fabric, 2.0 oz/sq.yd. (0.068 $kg/m^2$), 100% polyester fabric from Carlee Corporation; and KC 5A high loft fabric, approx. 2.5 oz per sq. yard (0.085 $kg/m^2$), 100% polyester fabric from Kimberly Clark Corporation.

Most preferred as a substrate for purposes of this invention are non-woven substrates, especially blends of rayon/polyester at ratios of 10:90 to 90:10, preferably ratios of 20:80 to 80:20, optimally 40:60 to 60:40 by

weight. A most useful substrate is a 70:30 rayon/polyester non-woven wipe article.

Anywhere from 1 to 100, preferably from 5 to 50 single wipes may be stored within a dispensing pouch or container, preferably a moisture impermeable pouch or container. During storage and between dispensing, the pouch or container is preferably resealable. Single wipe containing pouches may also be employed.

The dry cleansing wipes of the present invention are characterised by having wet flexibility or in other words, the wipe has the ability to substantially return to its original shape after being crushed, while saturated with water during use.

"Substantially returning to its original shape" is herein defined as the single apertured fabric returning to at least 30 percent, preferably 40 percent of its original z-axis dimension using the stepwise loading and unloading bulk test as described below. Techniques to impart wet flexibility to woven and non-woven fabrics are well known in the art. Art recognized methods to improve wet flexibility of non-wovens include 1) increasing the level of latex, acrylic, or other binders; 2) laminating two or more fabrics together; 3) employing longer and/or stiffer fibers; 4) employing larger diameter fibers; or 5) modifying the manufacturing processes such as by employing needle-punching to form a stiffer fabric, or the like.

The dry cleansing wipes of the present invention comprise at least one apertured fabric, where a pattern is created by a network of bundled fiber segments surrounding apertures or holes; or in a contiguous nonwoven web which has been apertured or provided with slits or other openings. In one preferred embodiment, the water insoluble material is a substantially contiguous network of water insoluble fibers having a plurality of macroscopic openings. A macroscopic opening is defined as an opening that is large relative to the intrinsic pore size of the water insoluble material.

In a typical spunbond or bonded carded web, for example, a macroscopic opening would appear to the eye to be a deliberately introduced hole or void in the web rather than a characteristic pore between adjacent fibers, and specifically could have a characteristic width of from about 0.1 mm to about 5 mm, or larger; preferably from about 1 mm to about 5 mm. A useful characteristic width may be defined as 4 times the area of the aperture divided by the perimeter. Useful fabric aperture densities are from about 10 to 700 per square inch (from about 1.6 to about 108.5 per $cm^2$), preferably from about 20 to 500 per square inch (from about 3.1 to about 77.5 per $cm^2$).

As discussed above, the nonwoven web may be made from synthetic fibers, as is known in the art, and may be a spunbond web, a meltblown web, a bonded carded web, or other fibrous nonwoven structures known in the art. For example, a polyester nonwoven web such as a low basis weight spunbond material could be provided with apertures through pin aperturing; perf embossing and mechanical stretching of the

web; die punching or stamping to provide apertures or holes in the web; hydroentangling to impart apertures by rearrangement of the fibers due to the interaction of water jets with the fibrous web as it resides on a patterned, textured or three-dimensional substrate that imparts a pattern to the web; water knives that cut out desired apertures or holes in the web; laser cutters that cut out portions of the web; patterned forming techniques, such as air laying of synthetic fibers on a patterned substrate to impart macroscopic openings; needle punching with sets of barbed needles to engage and displace fibers; and other methods known in the art. Preferably, the openings are provided in a regular pattern over at least a portion of an outersheet of the absorbent article.

The water insoluble substrates or fabrics of the present invention can comprise two or more layers, each of which may have a different texture and abrasiveness. The differing textures can result from the use of different combinations of materials or from the use of a substrate having a more abrasive side for exfoliation and a softer, absorbent side for gentle cleansing. In addition, separate layers of the substrate can be manufactured to have different colors, thereby helping the user to distinguish the surfaces.

The apertured fabric or sheet may be bonded to at least one other nonwoven sheet of water insoluble fibers ("second sheet") by lamination, adhesives, stitching, fasteners, or other art recognized binding methods. Preferably, the second sheet is attached to the apertured sheet by means of lamination, adhesives and related agents, including hot

melts, latexes, glues, starch, waxes, and the like, which adhere or join the upper regions of the apertured sheet with adjacent portions of the second sheet. Preferably, adhesives are applied only to the most elevated portions of the apertured sheet to effect the bonding between the apertured sheet and the second sheet, leaving the apertures substantially free of adhesive.

Adhesive application can be through meltblown application of hot melt glues and thermoplastic materials, spray or swirl nozzles of melted or dissolved adhesives, printing of adhesive material onto one or both surfaces before joining, and the like. If adhesives are applied directly to the apertured sheet by means of spray, mist, aerosol, or droplets in any form, prior to contact of the apertured sheet with the water insoluble matter, then it is desirable to use a template or patterned shield to prevent application of adhesive to the apertures to avoid clogging.

Preferably, the second sheet is composed of polyester or a polyester and cellulose blend, does not contain apertures and has the characteristics of high loft, a basis weight of from about 1 to 5 ounces per square yard (from about 0.034 to 0.170 $kg/m^2$), preferably from about 2 to 3 ounces per square yard (from about 0.0678 to 0.1017 $kg/m^2$) and optionally contains a binder. Useful binders include latex or acrylic materials added to the fabric in an amount of from about 5 to 40 weight percent of the fabrics total weight, preferably from about 5 to 25 weight percent.

The wipes of the present invention also contain a lathering surfactant. By a "lathering surfactant" is meant a surfactant, which when combined with water and mechanically agitated generates a foam or lather. Preferably, these lathering surfactants should be mild, which means that they must provide sufficient cleansing or detersive benefits but not overly dry the skin or hair, and yet meet the lathering criteria described above.

The products of the present invention typically comprise a lathering surfactant to substrate weight ratio of from about 0.005 to 2, preferably from about 0.05 to 1, more preferably from about 0.1 to 0.5.

A wide variety of lathering surfactants are useful herein and include those selected from the group consisting of anionic, nonionic, cationic, amphoteric and lathering surfactant mixtures thereof.

Among the anionic lathering surfactants useful herein are the following non-limiting examples which include the classes of:

(1) Alkyl benzene sulfonates in which the alkyl group contains from 9 to 15 carbon atoms, preferably from 11 to 14 carbon atoms in straight chain or branched chain configuration. Especially preferred is a linear alkyl benzene sulfonate containing about 12 carbon atoms in the alkyl chain.

(2) Alkyl sulfates obtained by sulfating an alcohol having 8 to 22 carbon atoms, preferably 12 to 16 carbon atoms. The alkyl sulfates have the formula $ROSO_3$-$M^+$ where R is the $C_{8-22}$ alkyl group and M is a mono- and/or divalent cation.

(3) Paraffin sulfonates having 8 to 22 carbon atoms, preferably 12 to 16 carbon atoms, in the alkyl moiety. These surfactants are commercially available as Hostapur SAS from Hoechst Celanese.

(4) Olefin sulfonates having from 8 to 22 carbon atoms, preferably 12 to 16 carbon atoms. Most preferred is sodium $C_{14}$-$C_{16}$ olefin sulfonate, available as Bioterge AS 40®

(5) Alkyl ether sulfates derived from an alcohol having from 8 to 22 carbon atoms, preferably from 12 to 16 carbon atoms, ethoxylated with less than 30, preferably less than 12, moles of ethylene oxide. Most preferred is sodium lauryl ether sulfate formed from 2 moles average ethoxylation, commercially available as Standopol ES-2®.

(6) Alkyl glyceryl ether sulfonates having from 8 to 22 carbon atoms, preferably from 12 to 16 carbon atoms, in the alkyl moiety.

(7) Fatty acid ester sulfonates of the formula: $R^1CH(SO_3$-$M+)CO_2R^2$ where $R^1$ is a straight or branched $C_8$ to $C_{18}$ alkyl, preferably $C_{12}$ to $C_{16}$, and $R^2$ is a straight or

branched $C_1$ to $C_6$ alkyl, preferably $C_1$, and M+ represents a mono- or divalent cation.

(8) Secondary alcohol sulfates having from 6 to 18, preferably from 8 to 16 carbon atoms.

(9) Fatty acyl isethionates having from 10 to 22 carbon atoms, with sodium cocoyl isethionate being preferred.

(10) Dialkyl sulfosuccinates wherein the alkyl groups have from 3 to 20 carbon atoms each.

(11) Alkanoyl sarcosinates corresponding to the formula $RCON(CH_3)CH_2CH_2CO_2M$ wherein R is alkyl or alkenyl having from about 10 to about 20 carbon atoms and M is a water-soluble cation such as ammonium, sodium, potassium and trialkanolammonium. Most preferred is sodium lauroyl sarcosinate.

(12) Alkyl lactylates wherein the alkyl groups have from 8 to 18 carbon atoms, with sodium lauryl lactylate sold as Pationic 138 C® available from the Patterson Chemical Company as the most preferred.

(13) Taurates having from 8 to 16 carbon atoms, with cocoyl methyl taurate being preferred.

Nonionic lathering surfactants suitable for the present invention include $C_{10}$-$C_{20}$ fatty alcohol or acid hydrophobes condensed with from 2 to 100 moles of ethylene oxide or

propylene oxide per mole of hydrophobe; $C_2$-$C_{10}$ alkyl phenols condensed with from 2 to 20 moles of alkylene oxides; mono- and di- fatty acid esters of ethylene glycol such as ethylene glycol distearate; fatty acid monoglycerides; sorbitan mono- and di- $C_8$-$C_{20}$ fatty acids; and polyoxyethylene sorbitan available as Polysorbate 80 and Tween 80® as well as combinations of any of the above surfactants.

Other useful nonionic surfactants include alkyl polyglycosides, saccharide fatty amides (e.g. methyl gluconamides) as well as long chain tertiary amine oxides. Examples of the latter category are: dimethylododecylamine oxide, oleyldi(2-hydroxyethyl)amine oxide, dimethyloctylamine oxide, dimethyldecylamine oxide, dimethyltetradecylamine oxide, di(20-hydroxyethyl)tetradecylamine oxide, 3-didodecyoxy-2-hydroxypropyldi(3-hydroxypropyl)amine oxide, and dimethylhexadecylamine oxide.

Amphoteric lathering surfactants useful for the present invention include aliphatic secondary and tertiary amines, preferably wherein the nitrogen is in a cationic state, in which the aliphatic radicals can be straight or branched chain and wherein one of the radicals contains an ionizable water solubilizing group such as carboxy, sulphonate, sulphate, phosphate or phosphonate. Illustrative substances are cocoamidopropyl betaine, cocoamphoacetate, cocoamphodiacetate, cocoamphopropionate, cocoamphodipropionate, cocoamidopropyl hydroxysultaine,

cetyl dimethyl betaine, cocoamidopropyl PG-dimonium chloride phosphate, coco dimethyl carboxymethyl betaine, cetyl dimethyl betaine and combinations thereof.

The lathering surfactant to substrate weight ratio is typically from about 0.005 to 2, preferably from about 0.05 to 1, more preferably from about 0.1 to 0.5.

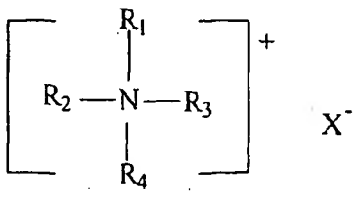
A humectant is optionally incorporated in compositions of the present invention. The humectants are normally polyols. Representative polyols include glycerin, diglycerin, polyalkylene glycols and more preferably alkylene polyols and their derivatives including propylene glycol, dipropylene glycol, polypropylene glycol, polyethylene glycol and derivatives thereof, sorbitol, hydroxypropyl sorbitol, hexylene glycol, 1,2-butylene glycol, 1,2,6-hexanetriol, isoprene glycol, ethoxylated glycerol, propyoxylated glycerol and mixtures thereof. The most preferred is 2-methyl-1,3-propanediol available as MP Diol from the Arco Chemical Company. Amounts of the polyol may range from about 0.5 to about 95%, preferably from about 1 to about 50%, more preferably from about 1.5 to 20%, optimally from about 3 to about 10% by weight of the deposited composition.

Impregnated compositions of the present invention may also include silicones of a volatile and non-volatile variety. Typical volatile silicones are the cyclomethicones commercially available as Dow Corning 244, 245, 344 and 345. Linear volatile dimethicones are also suitable. Non-volatile silicones include polydimethyl siloxanes of a

viscosity greater than 2 centistoke and silicone copolyols also known as dimethicone copolyol for which Dow Corning 193 is a commercial source. Amounts of the silicones may range from about 0.01 to about 20, preferably from about 0.5 to about 3% by weight of the deposited composition.

Monomeric and polymeric cationic conditioning agents are also useful for purposes of this invention. Examples of the polymeric cationic conditioning agents include: cationic cellulose derivatives, cationic starches, copolymers of a diallyl quaternary ammonium salt and an acryl amide, quaternized vinylpyrrolidone, vinylimidazole polymers, polyglycol amine condensates, quaternized collagen polypeptide, polyethylene imine, cationized silicone polymer (e.g. Amodimethicone), cationic silicone polymers provided in a mixture with other components under the trademark Dow Corning 929 (cationized emulsion), copolymers of adipic acid and dimethylaminohydroxypropyl diethylenetriamine, cationic chitin derivatives, cationized guar gum (e.g. Jaguar C-B-S, Jaguar C-17, Jaguar C-16 etc. manufactured by the Celanese Company), quaternary ammonium salt polymers (e.g. Mirapol A-15, Mirapol AD-1, Mirapol AZ-1, etc., manufactured by the Miranol Division of the Rhone Poulenc Company). Most preferred is polyquaternium-11 available as Luviquat® PQ 11 sold by the BASF Corporation.

Examples of monomeric cationic conditioning agents are salts of the general structure:



Wherein $R^1$ is selected from an alkyl group having from 12 to 22 carbon atoms, and aromatic, aryl and alkaryl groups having from 12 to 22 carbon atoms; $R^2$, $R^3$, and $R^4$ are each independently selected from hydrogen, an alkyl group having from 1 to 22 carbon atoms, and aromatic, aryl and alkaryl groups having from 12 to 22 carbon atoms; and $X^-$ is an anion selected from chloride, bromide, iodide, acetate, phosphate, nitrate, sulfate, methyl sulfate, ethyl sulfate, tosylate, lactylate, citrate, glycolate, and mixtures thereof. Additionally, the alkyl groups can also contain ether linkages, or hydroxy or amino group substituents (e.g. the alkyl groups can contain polyethylene glycol and polypropylene glycol moieties). Preferably the anion is phosphate, especially preferred is hydroxy ethyl cetyl dimonium phosphate available as Luviquat® Mono CP from the BASF Corporation.

Amino silicone quats may similarly be employed. Most preferred is Silquat AD designated by the CTFA as Silicone Quaternium 8, available from Siltech Inc.

Amounts of each cationic agent may range from about 0.01 to 5%, preferably from about 0.1 to about 3%, optimally from about 0.3 to about 2.5% by weight of the deposited composition.

The disposable, single use personal care cleansing products of the present invention are manufactured by separately or simultaneously adding onto or impregnating into a water insoluble substrate a lathering surfactant and a fatty acid.

The resulting product is substantially dry. By "separately" is meant that the surfactants and fatty acids can be added sequentially, in any order without first being combined together. By "simultaneously" is meant that the surfactants and fatty acids can be added at the same time, with or without first being combined together.

The surfactant, fatty acids and any optional ingredients can be added onto or impregnated into the water insoluble substrate by any means known to those skilled in the art. For example, addition can be through spraying, laser printing, splashing, dipping, soaking, or coating.

When water or moisture is used or present in the manufacturing process, the resulting treated substrate is then dried so that it is substantially free of water. The treated substrate can be dried by any means known to those skilled in the art. Non-limiting examples of known drying means include the use of convection ovens, radiant heat sources, microwave ovens, forced air ovens, and heated rollers or cams. Drying also includes air drying without the addition of heat energy, other than that present in the ambient environment. Also, a combination of various drying methods can be used.

The treated, dry wipe articles of the present invention are manufactured by adding onto or impregnating into the apertured sheet, an aqueous liquid composition containing a lathering surfactant,a structurant or volatile solvent, and optionally a water insoluble functional agent.

Techniques for coating or impregnating the apertured sheet are well known in the art and are not elaborated on here. Preferably, the aqueous liquid composition of the present invention is coated on by means of a process comprising spraying, printing, splashing, dipping, soaking, flood coating, spray coating or metered dosing. More specialized techniques, such as Meyer Rod, floating knife or doctor blade may also be used.

After the coating or impregnating and optionally drying in the case where a volatile solvent is employed, the lathering surfactant to substrate weight ratio is typically from about 0.005 to 2, preferably from about 0.05 to 1, more preferably from about 0.1 to 0.5.

Prior to or after impregnation of the aqueous liquid composition into the apertured sheet, the sheet may be folded into stacks. The sheet is then typically packaged in any of the moisture and vapor impermeable packages known in the art.

For treatment of the user's skin or hair, the treated wipe is saturated with water, manipulated manually to generate a lather, and is applied to a surface (e.g., a skin surface) via topical application to release or deposit an effective amount of the aqueous liquid composition to perform the desired cleansing or other function. The amount of water-insoluble functional ingredient delivered from the wipe and frequency of topical application can vary widely, depending upon the individual user's needs. With respect to personal application to the skin, such application could range, for

example, from about once per day to about four times daily, preferably from about twice per day to about three times daily. The number of wipes used per application can range from 1 to about 4 wipes, preferably 1 to about 2 wipes. The amount of water-insoluble functional ingredient deposited on each wipe is generally from about 3.5 mg to about 175 mg per wipe. The treated wipes of the present invention can also be used prophylactically by administrating to healthy skin surfaces to guard against or prevent undesired skin conditions and/or infections using the dosing regimen described above.

Except in the operating and comparative examples, or where otherwise explicitly indicated, all numbers in this description indicating amounts of material ought to be understood as modified by the word "about".

The following Examples will more fully illustrate the embodiments of this invention. All parts, percentages and proportions referred to herein and in the appended claims are by weight unless otherwise illustrated.

EXAMPLE 1

Cleansing articles according to the present invention may have facial cleansing compositions as outlined in Tables 1 to 3. 0.75 grams of the composition of Table 3 was placed on a number of individual 6 by 8 inch (152.4 by 203.2 mm) apertured substrates, dried in an oven, and the dynamic lather coefficients were measured as described below. Apertures were made in a sample of non-apertured Buckeye

6009 for evaluation purposes. Non-apertured Buckeye 6009 was used as a control for the Dynamic Lather Coefficient determination.

| Fabric | Apertures-Diameter and density (mm and no./sq. in.) | Dynamic Lather Coefficient[1] | | Wet Flexi-bility (%) | Lather Character |
|---|---|---|---|---|---|
| | | Initial | Exhaustion | | |
| Inventive: | | | | | |
| PGI | 2 - 3; 40 - 45 | 1.61 | 2.61 | 47.1 | Rich, bubbly |
| Comparative: | | | | | |
| Buckeye 6009 | N/A | 1.00 | 1.00 | 6.7 | Airy |
| Buckeye 6009 | 4; 8 - 10 | 1.29 | 1.29 | 6.7 | Airy |
| Oil of Olay® normal to oily[2] | N/A | 0.73 | 0.86 | 13.7 | Runny |
| Oil of Olay® normal to dry | 2-3; 20 - 24 | 0.73 | 0.86 | 28.0 | Runny |

TABLES 1 to 3

Compositions according to Tables 1 to 3 were prepared in the following manner. Hexyleneglycol, betaine and polyquaternium 7 were mixed together under moderate to vigorous agitation. Thereafter decyl polyglucoside, sarcosinate, lactylate, and triglycerides were added

[1] Control Buckeye 6009 non-apertured initial lather volume is 130 mls and exhaustion lather volume is also 130 mls.
[2] Oil of Olay® wipes were tested without further modification.

separately until dissolved while heating the reactor at 80°C under agitation. The resultant composition was cooled to 60°C whereupon the silicone quaternary ammonium salt was blended into the composition. Fragrance and preservatives were folded into the composition after the latter had been cooled to 45°C. A six inch by eight inch (152.4 by 203.2 mm) single apertured sheet of one gram was then loaded with 0.75 grams of the composition of Table 1 and 3 with no drying, and 1.2 grams of the composition of Table 2 followed by oven drying.

TABLES 4 and 5

The compositions according to Tables 4 and 5 are prepared in the following manner: hexylene glycol, polymer JR400, hydroxy methyl cellulose, sodium laureth sulfate, and lauryl alcohol were all mixed together under moderate to vigorous agitation while the reactor was maintained at 80°C. Citric acid was then added to adjust the pH to 5.5. Next methylchloroisothiazolione and caprylic/capric triglycerides were dissolved and the blend is allowed to cool to 45°C after which the fragrance was added.

Table 6

The composition according to Table 6 was prepared in the following manner: stearic acid was heated to 160 to 170°F (71 to 77°C) and 5% of it was neutralised with sodium hydroxide. The blend was then heated to 180 to 200°F (82 to 94°C) and sodium cocyl isethionate was added with agitation, next PEG 8000, betaine, glycerin and sunflower seed oil were

added with agitation. Fragrance was added after the blend was cooled to 45°C.

Table 7

The composition according to table 7 was prepared in the following manner: stearic acid, maltodextrin, PEG 300, and water were blended together at a temperature of 160 to 170 °F (71 to 77°C), sodium cocyl isothionate is then added at a temperature of 180 to 200°F F (82 to 94°C), PEG 8000 was then added followed by the betaine, glycerin and the mixture is allowed to cool to below 170°F (77°C) and then sunflower seed oil was added. Lastly fragrance was added after the blend was cooled to 45°C.

Example 2

Cleansing articles according to the present invention may contain cleansing compositions as outlined under Tables 4 to 7. In the following example, 4.8 grams of the composition according to Table 4 was placed on various individual apertured water insoluble substrates that were thereafter laminated to individual, non-apertured, high-loft, water insoluble substrates as described below. The dynamic lather coefficients were measured of both (A) the individual apertured coated fabric alone and (B) the laminated article as an average of 3 replicates of initial lather volume measurement and 3 replicates of total lather volume measurement until exhaustion of lather production from the article.

Results

(A) Single Fabric

| Fabric | Apertures- Diameter (mm) and no./sq. inch | Dynamic Lather Coefficient | | Lather |
|---|---|---|---|---|
| | | Initial[3] | Exhaustion[3] | |
| Inventive | | | | |
| PGI | 2-3; 40 - 45 | 1.43 | 1.48 | Rich bubbly |
| Dupont 8868 | 1.5 - 2; 150 - 160 | 1.41 | 1.48 | Rich bubbly |
| Comparative | | | | |
| Carlee | N/A | 1.43 | 1.35 | - |
| Felix 7027 | N/A | 1.00 | 1.00 | Loose bubbly |
| Diamond | N/A | 1.72 | 1.51 | Airy bubbly |
| CLC 059 | N/A | 0.98 | 0.95 | Runny bubbly |
| CLC 062 | N/A | 1.50 | 1.67 | Loose, runny bubbly |
| NC 008 | N/A | 1.70 | 2.05 | Very Airy |
| KC - 5A | N/A | 1.31 | 1.14 | |

[3] Control Felix 7021 initial lather volume is 135 mls and exhaustion lather volume is 415 mls.

Fabric Description

List of Fabrics, Content and Texture:

| Fabric Name | Appearance | Basis wt. And Type |
|---|---|---|
| PGI, Lavett | 7 holes per linear inch Rectangular apertures about 2 - 3 mm; 40 - 45 per sq. in. | 2.35 oz/sq. yd. (0.080 kg/m$^2$), 63% rayon/29% PET/8% binder |
| Dupont 8868 | 13 holes per linear inch Rectangular apertures about 1.5 - 2 mm; 150 - 160 per sq. in. | 2.2 oz/sq.yd. (0.075 kg/m$^2$), 50% wood pulp/50%polyester |
| Carlee high loft | High loft, non-apertured | 2.0 oz/sq.yd. (0.068 kg/m$^2$), 100% polyester |
| Felix 7027 from PGI | Flat, non-apertured | 2.3 oz/sq.yd. (0.078 kg/m$^2$), 65% rayon/ 35 % polyester |
| Diamond KK105 from Miratec | Raised textured, non-apertured | 2.9 oz/sq.yd. (0.098 kg/m$^2$), 50 cotton/ 50% polyester |
| CLC 059 from Miratec | Flat, non-apertured | 3.3 oz/sq.yd. (0.112 kg/m$^2$), 100% rayon |
| CLC 062 from Miratec | Flat, non-apertured | 3 oz/sq/yd. (0.102 kg/m$^2$), 50% rayon/ 50% PET |
| NC 008 from Miratec | Flat, non-apertured | 3 oz/sq. yd. (0.102 kg/m$^2$), 100% polyester |
| KC 5A from Kimberly Clark | High loft, non-apertured | Approx. 2.5 oz/sq. yd. (0.085 kg/m$^2$), 100% polyester |
| Buckeye #6009 | Flat, non-apertured and with hand made apertures | 2.3 oz/sq. yd. (0.078 kg/m$^2$) , wood pulp |

5

B) Laminated Fabric

| Fabric | Dynamic Lather Coefficient | | Lather |
|---|---|---|---|
| | Initial[4] | Exhaustion[4] | |
| Inventive: (apertured) | | | |
| PGI/ Carlee | 1.19 | 1.28 | Creamy, bubbly |
| Dupont 8868/ Carlee | 1.25 | 1.66 | Creamy, rich, thick |
| KC - 5A/ PGI | 1.21 | 1.16 | Bubbly |
| CLC 059/PGI | 0.99 | 1.25 | Bubbly, runny |
| Comparative: (non-apertured) | | | |
| Felix / Carlee | 1.00 | 1.00 | Bubbly, loose |
| Diamond / Carlee | 1.10 | 1.42 | Rich, creamy, some bubbles |
| CLC 059/Carlee | 0.93 | 1.23 | Creamy, airy, bubbles |
| NC 008/ Carlee | 0.88 | 1.34 | Creamy, bubbly |
| CLC 062/ Carlee | 0.99 | 1.64 | Creamy |

Experimental test methods:

Wet Flexibility

The wet flexibility of the impregnated substrates was evaluated using the following test procedure: samples were submersed in a pan of water for about 2 seconds and the excess water was removed by contacting the sample on both sides with blotter paper. The sample was then placed in a bulk testing device and the sample thickness or z-axis distance was measured at increasing incremental loads of

[4] Control Felix 7021/Carlee high loft laminate initial lather volume is 192 mls and exhaustion lather volume is 688 mls

from 0.10 to 3.0 PSI (from 689.4 to 20682 $Nm^{-2}$) followed by decreasing incremental loads of from 2.5 to 0.10 PSI (from 17235 to 689.4 $Nm^{-2}$). The % wet flexibility (or % z-axis recovery) was calculated by dividing the z-axis recovery distance by the z-axis maximum compression displacement distance, the result then multiplied by 100. The z-axis recovery distance was obtained as the difference in height between the unloaded sample recovery height and the sample height at 3.0 PSI (20682 $Nm^{-2}$) loading.

Table 1 Solution A

| Ingredient Name | W/W % |
|---|---|
| Hexylene Glycol | 16.26 |
| Polyquaternium 7, 95% | 1.07 |
| Cocamidopropyl betaine, 82% active | 17.60 |
| Decyl polyglucoside | 36.09 |
| Sodium lauryl sarcosinate, 94% active | 17.60 |
| Sodium Lauryl lactylate | 1.65 |
| Capric/caprylic triglycerides | 2.50 |
| Silicone quaternum-8, 40% | 6.63 |
| Fragrance | 0.40 |
| DMDM hydantoin and iodopropynyl butylcarbamate in butylene glycol | 0.20 |

Table 2 Solution B

| Ingredient Name | W/W % |
|---|---|
| Water | 10.20 |
| PEG 9 M | 1.00 |
| Cocamidopropyl betaine, 30% | 30.00 |
| Decyl glucoside 50% | 20.00 |
| Sodium lauroyl sarcosinate 30% | 30.00 |
| Hydroxyethyl cetyldimonium phosphate 40% | 2.00 |
| Sodium Lauryl lactylate | 1.00 |
| Polyquaternium 11, 30% | 1.00 |
| Silicone quaternium-8, 40% | 4.00 |
| Fragrance | 0.60 |
| DMDM hydantoin and iodopropynyl butylcarbamate in butylene glycol | 0.20 |

Table 3 Solution B2

| Ingredient Name | W/W % |
|---|---|
| Hexylene glycol | 16.26 |
| Polyquaternium 7, 95% | 1.07 |
| Cocamidopropyl betaine, 82% | 17.60 |
| Decyl glucoside 50% | 36.09 |
| Sodium lauroyl sarcosinate 94% | 17.60 |
| Sodium Lauryl lactylate | 1.65 |
| Capric/caprylic triglycerides | 2.50 |
| Silicone quaternium-8, 40% | 6.63 |
| Fragrance | 0.40 |
| DMDM hydantoin and iodopropynyl butylcarbamate in butylene glycol | 0.20 |

Table 4 Solution C

| Ingredient Name | W/W % |
|---|---|
| Hexylene Glycol | 39.61 |
| Polymer JR400 | 0.25 |
| Hydroxy Methyl Cellulose | 0.38 |
| Sodium Laureth sulfate | 35.71 |
| Cocoamido propyl betaine | 12.20 |
| Sodium lauryl sulfate | 7.73 |
| Lauryl alcohol | 0.50 |
| Citric acid (pH adjustment) | 0.10 |
| Methylchloroisothiazolione/ methylisothiazolinone | 0.02 |
| Caprylic/capric triglycerides - fractionated coconut oil | 2.50 |
| Fragrance | 1.00 |
| Physical properties | |
| Viscosity (50°C) | <5000 cps |
| pH | 5.5 |

Table 5 Solution D

| Ingredient Name | W/W % |
|---|---|
| Hexylene Glycol | 28.31 |
| Polymer JR400 | 0.30 |
| Hydroxy Methyl Cellulose | 0.45 |
| Sodium Laureth sulfate | 42.86 |
| Cocoamido propyl betaine | 14.63 |
| Sodium lauryl sulfate | 9.28 |
| Lauryl alcohol | 0.60 |
| Citric acid (pH adjustment) | 0.05 |
| Methylchloroisothiazolione/ methylisothiazolinone | 0.02 |
| Caprylic/capric triglycerides - fractionated coconut oil | 2.50 |
| Fragrance | 1.00 |
| Physical properties | |
| Viscosity (50°C) | <5000 cps |
| PH | 5.5 |

Table 6 Solution E

| Ingredient Name | W/W % |
|---|---|
| ASAD - stearic acid | 0.00 |
| Sodium Cocyl isethionate | 50.00 |
| PEG 8000 | 37.91 |
| Cocoamidopropyl betaine | 4.83 |
| Glycerine | 3.23 |
| Sunflower seed oil | 3.23 |
| Fragrance | 0.80 |

Table 7 Solution F

| Ingredient Name | W/W % |
|---|---|
| ASAD - Stearic acid | 5.00 |
| Maltodextrin | 0.67 |
| PEG 300 | 0.14 |
| Water | 0.19 |
| Sodium Cocyl isethionate | 50.00 |
| PEG 8000 | 31.91 |
| Cocoamidopropyl betaine | 4.83 |
| glycerine | 3.23 |
| Sunflower seed oil | 3.23 |
| Fragrance | 0.80 |

Latherability Test Methods:

The lather depicted in Figs. 5 (a), (b), (c); 6(a) and (b) and described in Table 2 (A) and (B) was generated by wetting the sample with warm running water and repeatedly squeezing the sample for approx. 3 to 4 seconds.

Dynamic Lather volume coefficients were calculated as the ratio of the sample lather volume to that of a control for Examples 1 and 2. The control for Example 1 was the Buckeye 6009 flat wood pulp, non-apertured fabric. The control for Example 2A was the Felix 7027 flat, non-apertured fabric, and for Example 2B was the same Felix fabric laminated with a Carlee high loft fabric.

A traditional Lather Volume (Funnel Method) test was employed. The test involved two large sinks and a measuring

funnel of 10.5 inch (266.7 mm) diameter and a 100 ml graduated cylinder with the bottom cleanly removed. The cylinder was fitted with a 0 ml mark over the funnel stem. The cylinder was then sealed to the funnel. The procedure involved placing the funnel on the bottom of sink #1. Distilled water was added to the sink until the 0 ml mark of the funnel. Tap water was added (~120ppm water hardness) to sink #2 until the water level reached the 0ml mark of the funnel. A desired temperature of 95 - 103°F (35 - 39.5°C) was then set.

The sample was placed under running tap water at 95 - 103°F (35 - 39.5°C) and soaked for about 5 seconds to condition the sample. The sample was then held between both hands under running the water and rotated for ten half turns to start forming lather. The sample was then rotated by hand for fifteen half turns to build up lather. The sample was then laid aside and the hands were worked to increase lather for 10 seconds. A funnel was then placed over the hands with both being placed into sink #1. When the hands were fully immersed, they are slid from under the funnel. The funnel was lowered to the bottom of the sink with lather volume being read. The value recorded was designated the initial lather volume. The process was repeated and the lather volumes recorded until no further lather was seen. The total lather volume was then summed and designated the exhaustion lather volume.

The foregoing description and examples illustrate selected embodiments of the present invention. In light thereof variations and modifications will be suggested to one

skilled in the art, all of which are within the scope and spirit of this invention.

CLAIMS

1. A disposable, single use, personal care cleansing product, which is substantially dry prior to use, has a wet flexibility of at least 30% and comprises:
(I) a water insoluble substrate; and
(II) a lathering surfactant.

2. A product according to claim 1, wherein the water insoluble substrate includes at least one sheet selected from the group consisting of non-woven, woven, hydro-entangled and air entangled substrates.

3. A product according to claim 1 or 2, wherein the water insoluble substrate comprises at least one apertured sheet.

4. A product according to claim 3, wherein said apertures have an average diameter along their major axis of from about 0.1 mm to 1.0 cm.

5. A product according to claim 4, wherein the average diameter along the major axis of said apertures is from about 1 to 5 mm.

6. A product according to any one of the preceding claims, having a wet flexibility a dynamic lather volume coefficient of at least about 1.4.

7. A product according to any one of the preceding claims, wherein the weight ratio of the lathering surfactant to the substrate is from about 0.005 to 2.

8. A product according to claim 7, wherein said weight ratio is from about 0.1 to 0.5.

9. A product according to any one of the preceding claims, wherein said lathering surfactant is selected from the group consisting of anionic, amphoteric, and nonionic surfactants, and mixtures thereof.

10. A product according to claim 9, wherein said lathering surfactant comprises at least one betaine and at least one sarcosinate surfactant.

11. A product according to any one of the preceding claims, wherein the water insoluble substrate comprises at least one apertured sheet and at least one non-apertured sheet bonded to said at least one apertured sheet.

12. A product according to claim 11, wherein said at least one non-apertured sheet contains a lathering surfactant in a weight ratio to the substrate of less than about 1.0.

13. A product according to any one of the preceding claims wherein said wet flexibility is greater than about 40%.

14. A method of preparing a product according to claim 1, which comprising:

(i) impregnating a water insoluble substrate with a composition comprising a lathering surfactant in a surfactant to substrate ratio of from about 0.005 to about 2; and

(ii) drying said impregnated substrate until said cleansing product contains a weight ratio of water to substrate of less than about 0.15.

15. A method according to claim 14, wherein said dried substrate has a wet flexibility of at least about 40%.

16. A method according to claim 14 or 15, wherein the weight ratio of surfactant to substrate is from about 0.1 to 0.5.

17. A method of cleansing the skin or hair, which comprises applying a product according to claim 1 to the skin or hair.

18. A method according to claim 17, wherein said personal cleansing product has a dynamic lathering volume coefficient of at least 1.4.

Fig.1.

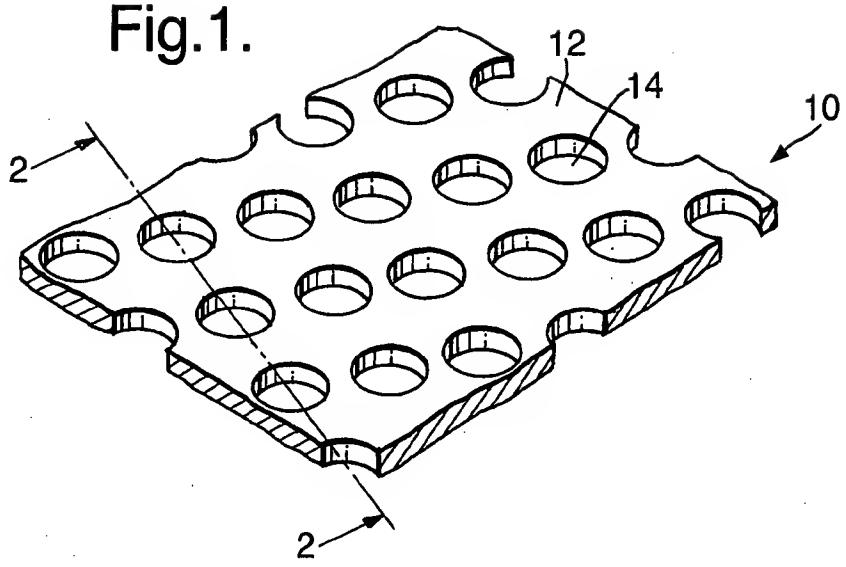



Fig.2.

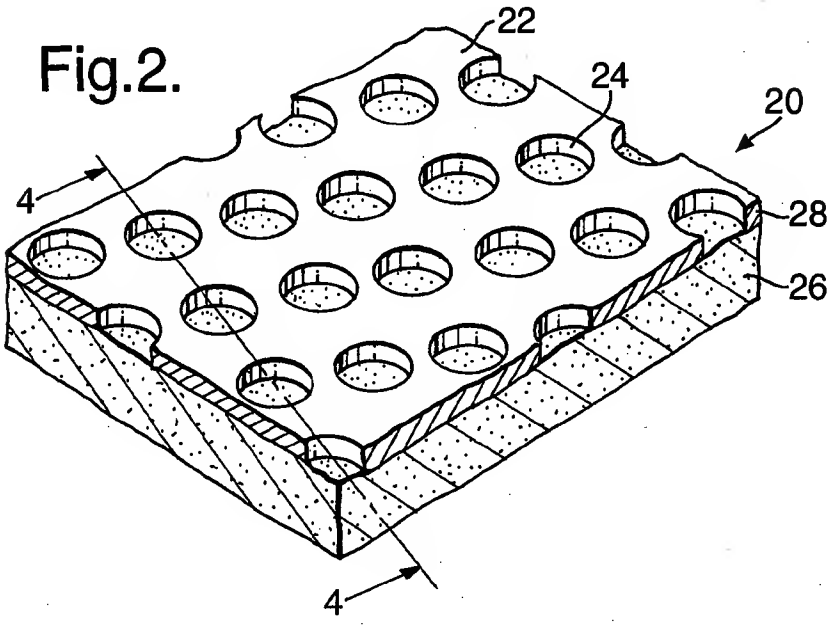



Fig.3.

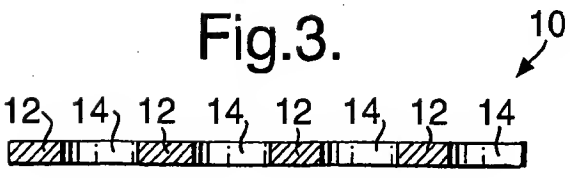



Fig.4.

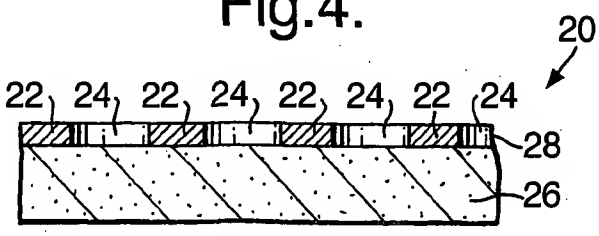


Fig.5A.

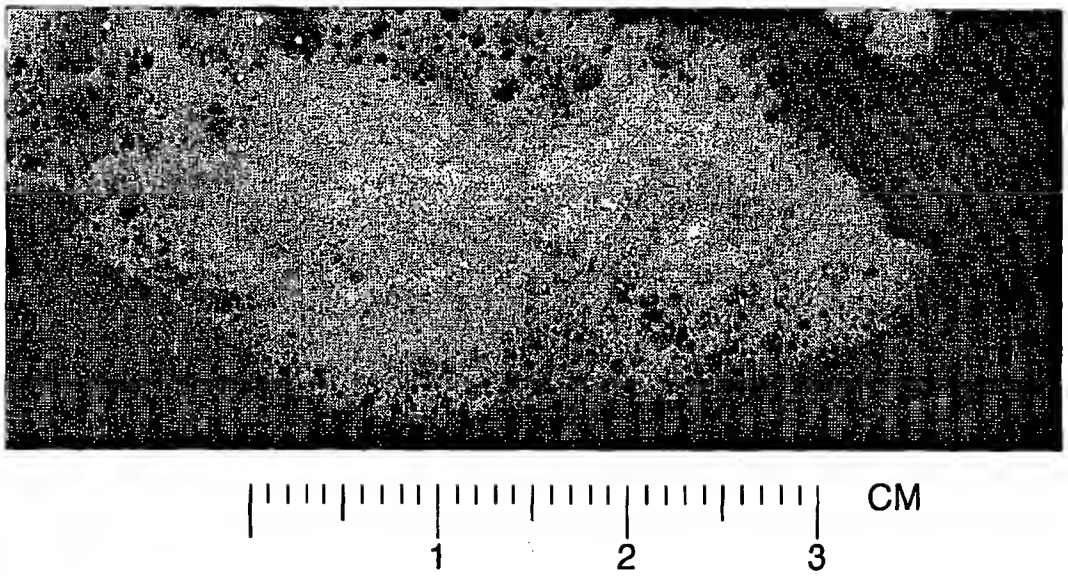



Fig.5B.

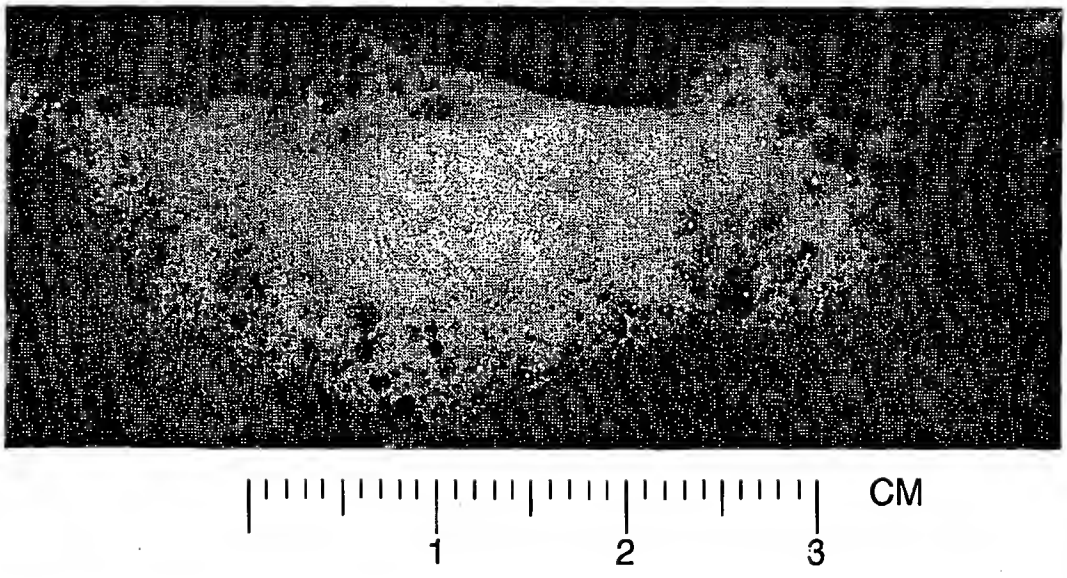


Fig.5C.

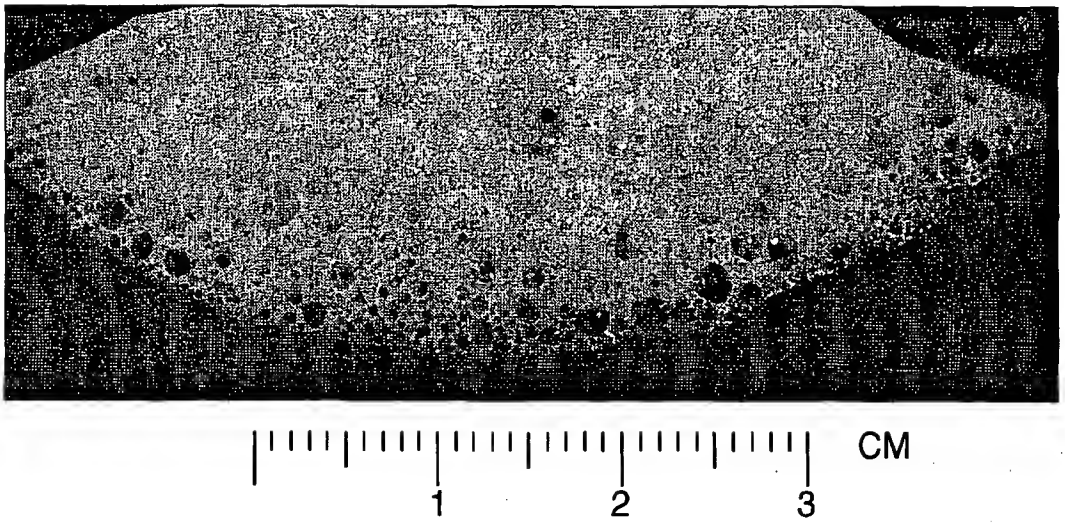



Fig.6A.

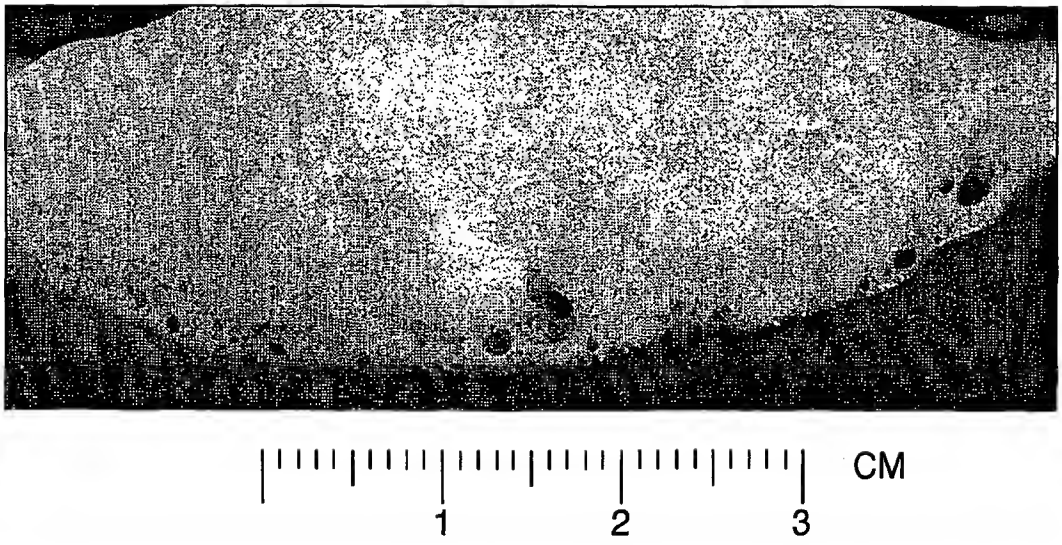


Fig.6B.